NIGHT VISION MODULE

COT NM-108 BC

user`s guide

Modern Optical Technologies

Safety Summary

Before operating this product, carefully read and study this Operation and Maintenance Manual.
The COT NM-108 BC night vision module is a precision electro-optical instrument and requires careful handling. To avoid physical danger or equipment damage when using the COT NM-108 BC, follow all WARNINGS, CAUTIONS and NOTES.

Below you will find definitions of the alerts that appear throughout this Manual:

WARNING — Identifies a clear danger to the person operating the equipment.
CAUTION — Identifies risk of damage to the equipment.
NOTE — Serves to highlight essential procedures, conditions, statements, or conveys important instructional data to the user.

WARNINGS:

- When installing the equipment on a weapon, be sure the weapon is clear and the safety is on before proceeding.
- It is recommended that you use an eyecup on the eyepiece of the day scope, allowing for the eyepiece diameter and eye relief and having side paddle preferably in order to escape detection.
- The light from the infrared illuminator is invisible to the unaided eye. However, the light can be detected by other night vision devices.

CAUTIONS:

- DO NOT dismantle the equipment.
- Keep the equipment clean. Protect it from moisture, dramatic temperature changes, and electric shocks.

⇨ DO NOT drop or hit the equipment.

- Protect the equipment from overexposure to light: DO NOT activate the equipment in daylight with the objective lens cap removed; DO NOT aim the equipment at bright light sources (a fire, car headlights, lanterns, street lamps, room lights, etc.).
- DO NOT force the equipment controls past their stopping points.
- DO NOT leave the equipment activated during breaks in operation.
- Verify that the equipment is off before installing a battery.
- DO NOT store the equipment with the battery still in it.
- To avoid deformation or damage, remove the light suppressor from the COT NM-108 BC before placing the equipment in storage.
- Thoroughly clean and dry each item before placing them into the storage case.

NOTES:

- Optical axes of the COT NM-108 BC and day scope should align. It is not recommended for the distance between the axes to exceed 3 mm. If the difference in the axis heights of the COT NM-108 BC and day scope above the weapon rail exceeds 3 mm, you will need to replace the day scope mounting rings or monoblock.
- At operating temperatures below -20 °C, alkaline battery life will be severely reduced. Under said conditions, the use of lithium battery is recommended.
- The equipment requires some level of ambient light (moonlight, starlight, etc.) to function correctly.

- Performance of the device in nighttime conditions depends on the level of ambient light in the environment. Please remember the following:
  - — The level of ambient light is reduced by the presence of clouds, shade, or objects that block natural light (trees, buildings, etc.).
  - — The equipment is less effective when operated in shadows and other darkened areas.
  - — The equipment is less effective when operated in rain, fog, sleet, snow, dust or smoke.
  - — The equipment will not “see” through dense smoke.
- For the purpose of returning defective components, retain all packaging materials.

How to Use This Manual

USAGE
You must familiarize yourself with this entire manual before operating the equipment. Before performing any kind of maintenance on your COT NM-108 BC, read the section on maintenance in its entirety. Follow all WARNINGS, CAUTIONS, and NOTES.

MANUAL OVERVIEW

The Manual contains sections on operating and maintaining the COT NM-108 BC night vision module.

Throughout this Manual, COT NM-108 BC will be referred to as the NM-108 BC , “the device”, or “the equipment”.

Reference data for the estimation of ambient illumination levels can be found in Appendix A.

Chapter 1. INTRODUCTION

1.1 General Information

1.1.1 Type of Manual

Operation and Maintenance (including a List of Spare Parts).

1.1.2 Model Number and Equipment Name

COT NM-108 BC

1.1.3 Purpose of Equipment

The COT NM-108 BC is a night vision system intended for use in conjunction with a daytime sight, or riflescope (hereafter referred to as a “day scope”). When mounted on a weapon in front of an existing day scope, the NM-108 BC adds to the scope’s capabilities a night vision function (up to range of 900m), without affecting the boresight. Advisable day scope magnification values are 3 to 12X (4 to 10X are optimal).

The NM-108 BC is compatible with most commercial and military specification day scopes, and fits any Picatinny MIL STD 1913 or Weaver rail via the quick release mount.

An optional long-range IR-illuminator enables use of the NM-108 BC in extremely low light conditions or total darkness. Other additional equipment, such as an infrared laser, red dot sight, etc., may

also be installed on the NM-108 BC top Weaver rail.

NOTE:

The NM-108 BC can also be installed in front of the viewfinders of various instruments to widen the operational illumination range.

Chapter 2. DESCRIPTION AND DATA

2.1 System Description

The NM-108 BC consists of two primary parts, as shown in Figure 2-1: the night vision device (hereafter referred to as NVD), and the quick release mount system, or mount. The NM-108 BC is delivered already assembled: the mount (B) should be secured to the rail (A) of the NVD (D) with two screws.

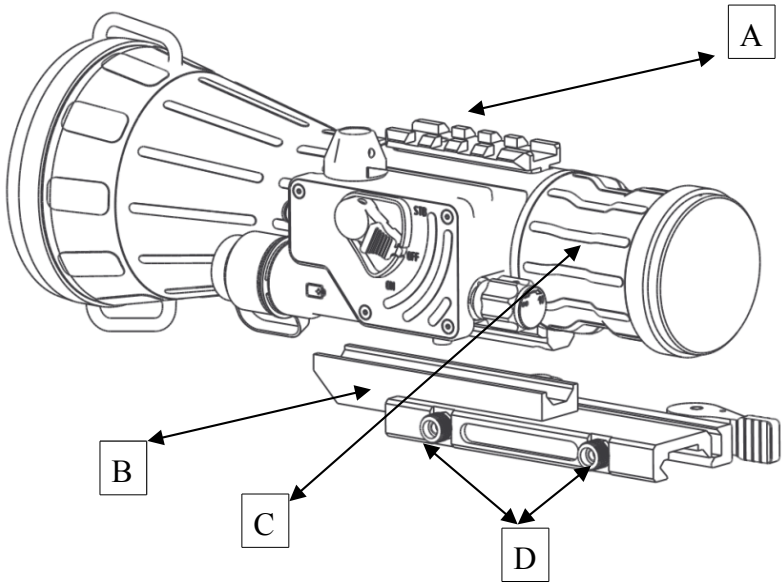

Figure 2-1. NM-108 BC NIGHT VISION CLIP ON SYSTEM

The optical-electronic system of the NVD includes four main components: the objective and output lenses, an image intensifier tube, and the wired body (C).

The objective lens focuses available light (photons) on the photocathode of the image intensifier tube (IIT). The light energy causes electrons to be released from the cathode. After being amplified, the electron flow represents an intensified version of the original image of the scene. The electrons then strike the IIT phosphor screen, which reacts to them by glow that is visible to the human eye. The image is projected by the output lens from the IIT screen to infinity, and the resulting image is magnified when viewed through the day scope. As such, when the NM-108 BC mounted in front of the day scope, it converts the latter into a night vision sight.

The automatic brightness adjustment system maintains consistent image brightness, even in changing light conditions. The manual gain control (optional feature) allows the operator to refine the image contrast by compensating for overly bright or extremely dark conditions.

The bright light protection system controls the existing ambient light through a photoreceiver, and

cuts off the IIT automatically when the illumination level exceeds the limit of 100…150 lx within 10 seconds. The NM-108 BC turns back on when removed from the excessive light.

The automatic shut-off function preserves battery life should the NM-108 BC be inadvertently activated.

The NM-108 BC is powered by a single AA or CR123A battery.

The NM-108 BC uses a LED indicator to show the operator when the bright light protection system is activated, or to indicate a low battery.

The Picatinny / Weaver mount (B) has an adjustable lever-cam clamping device for easy, quick and reliable mounting and removal of the NM-108 BC.

The NM-108 BC is shown in Figure 2-2. The ITEM NO. column in Table 2-1 indicates the number used to identify items in Figure 2-2.

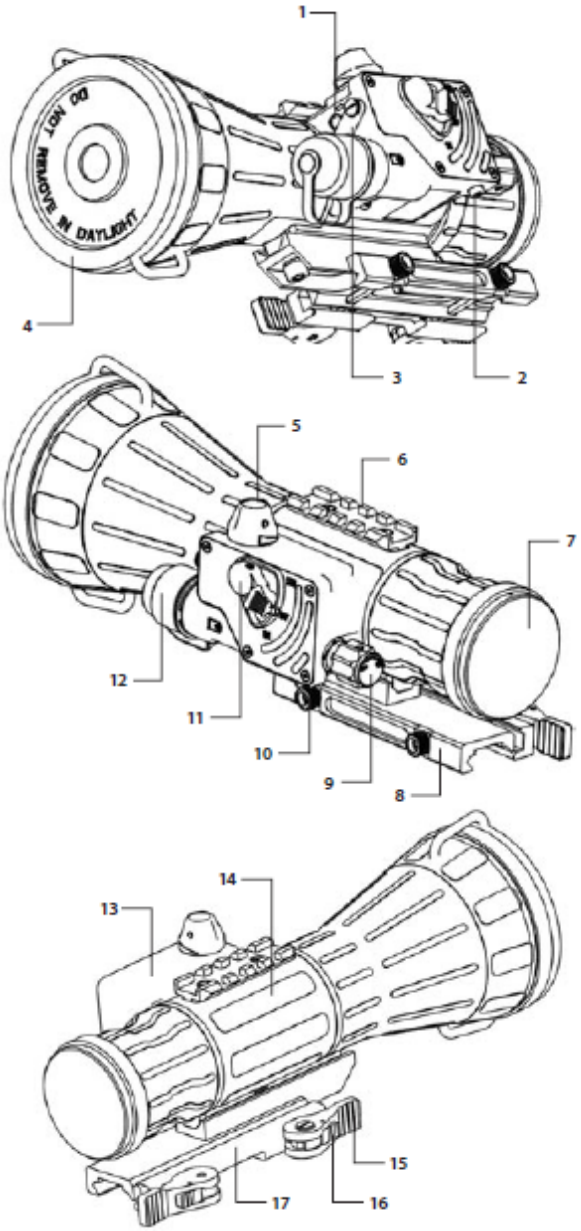

Figure 2-2. NM-108 BC NIGHT VISION CLIP ON SYSTEM

TABLE 2-1. SYSTEM DESCRIPTION

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Photoreceiver	9	Focus Knob
2	Purge Screw	10	Nut
3	Pivoted Shutter	11	Turn Switch
4	Objective Lens Cap	12	Battery Cap with Adapter
5	Gain Control Knob	13	Control Compartment
6	Top Weaver Rail	14	Main Body
7	Output Lens Cap	15	Cam Lever
8	Double Lever-Lock Quick-Release Picatinny Mount	16 17	Lever Holder Clamp

2.2 Specifications

TABLE 2-2. SYSTEM DATA

ITEM	DATA
Magnification	Unity (1X)
Boresight Characteristics: — Accuracy — Retention — Repeatability	 Factory aligned to 0.75 MOA or better Permanent to within 1.5 MOA or better Within 0.75 MOA
System Resolution subject to Image Intensifier Tube Resolution: — 45 to 54 lp/mm — 55 to 64 lp/mm — Over 65 lp/mm	 0.23 mrad/lp 0.19 mrad/lp 0.16 mrad/lp

TABLE 2-3. MECHANICAL DATA

ITEM	DATA
Dimensions (L×W×H)	235×97×80 mm
Weight (without Mount and Remote Control)	0.91 kg
Weight of Mount	0.1 kg
Height of the NM-108 BC Axis above Weapon's Picatinny / Weaver Rail	40 mm

TABLE 2-4. ELECTRICAL DATA

ITEM	DATA
Battery	Single AA (1.5V) or CR123A (3V)
Cell Life at 20°C	25 hr (1.5V) / 45 hr CR123A (3V)
Interrupting Time*	60 minutes

** — Optional feature. Interrupting Time setting can be changed at the production stage, or the function can be completely disabled.*

TABLE 2-5. OPTICAL DATA

ITEM	DATA
Objective Lens Focal Length	108 mm
Objective Lens F/number	1:1.5
Focus Range	10 m to infinity
Field of View	9º
Exit Pupil Diameter	40 mm

TABLE 2-6. ENVIRONMENTAL DATA

ITEM	DATA
Operating Temperature	-40 to +50 ºC
Storage Temperature	-50 to +50 ºC
Illumination Required	Natural night illumination (overcast starlight to moonlight)
Immersion	10 m for 30 minutes
MIL-STD-810	Complies

2.3 Standard Components

The NM-108 BC standard components are shown in Figure 2-3 and listed in Table 2-7.
The ITEM NO. column indicates the number used to identify items in Figure 2-3.

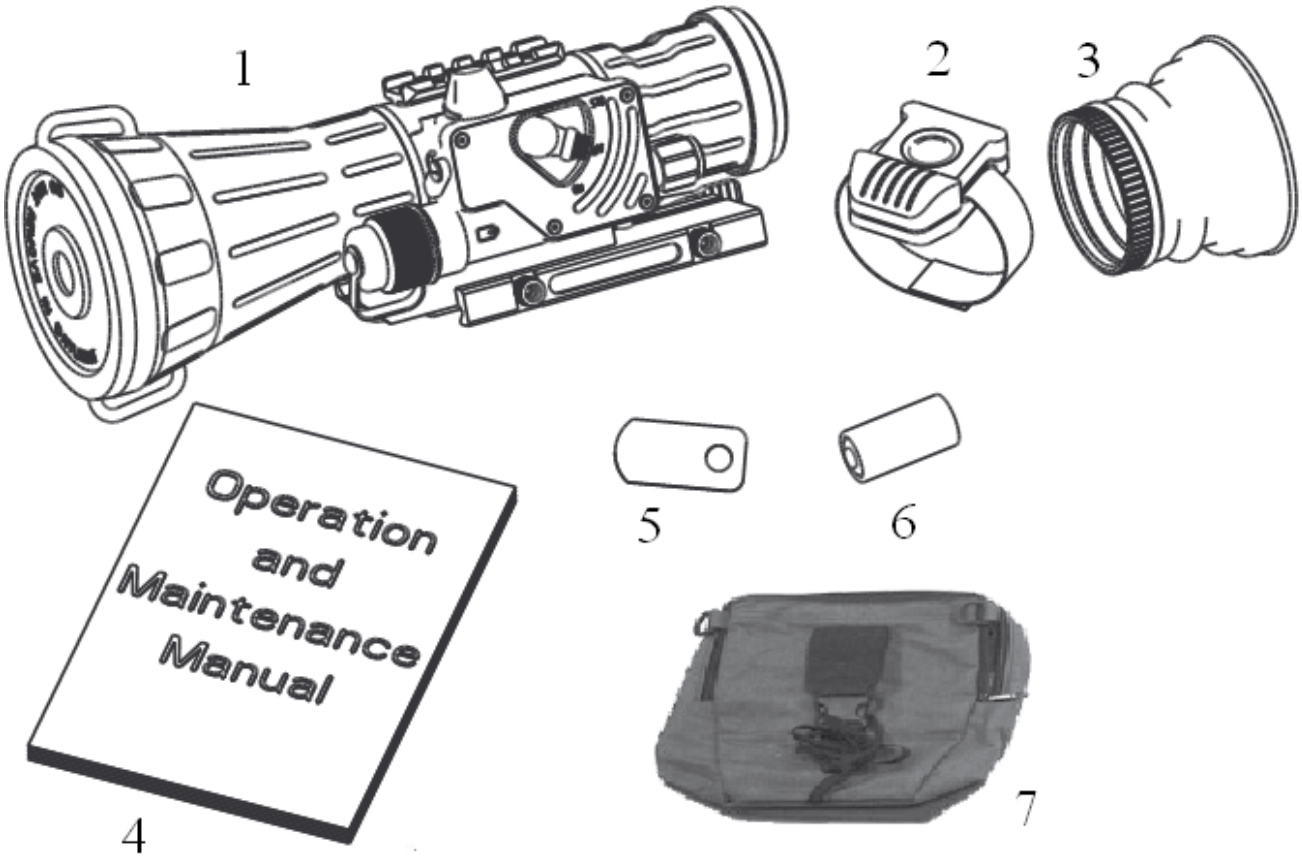

Figure 2-3. STANDARD COMPONENTS

TABLE 2-7. STANDARD COMPONENTS

ITEM NO.	DESCRIPTION	Q-TY
1	**NM-108 BC Night Vision Clip-On System** - a night vision device equipped with quick release mount, to be installed on a Picatinny/ Weaver rail. Intended for use in conjunction with a day scope.	1
2	**Wireless Remote Control Unit –** used to operate the NM-108 BC in short-time activation mode. Ensures quick and silent NM-108 BC activation / deactivation. Delivered with two CR2016 (3V) batteries installed.	1
3	**Light Suppressor** - a rubber cup installed on the NM-108 BC output lens to reduce light scattering.	1
4	**Operation and Maintenance Manual** - provides safety information, equipment description, mounting procedures, operating instructions, and preventive maintenance checks and services (including a List of Spare Parts).	1

5	**Special Wrench** - an instrument used for repositioning the adapter in the NM-108 BC battery cap, depending on the battery being installed.	1
6	**CR123A Battery** - a single lithium battery used to power the NM-108 BC.	1
7	**Soft Case** - used for carrying / storage of the NM-108 BC and its accessories.	1

2.4 Key Features

- Converts your daytime scope, sight, or binoculars into a night vision ones
- Mounts in front of any day scope with no re-zeroing required
- Available in a variety of high performing Gen 2+ and Gen 3 image intensifier tube options
- Wireless remote control
- Both automatic and manual gain control
- Powered by a single AA or CR123A battery
- Bright light cut-off system
- Bright light cut-off and low battery indications in the viewing area
- Interrupting time 60 minutes (optional feature)
- Filled with dry nitrogen to prevent internal fogging
- Mounts on Picatinny / Weaver rail with a quick release mount
- Mil Standard compliant

2.5 System Limitations

The NM-108 BC requires some ambient light (moonlight, starlight, etc.) to operate. Factors that can reduce natural night light and negatively affect the efficiency and operation of the NM-108 BC include: rain, fog, sleet, snow, and smoke; passing cloud cover and objects that produce shadows; and low-contrast environments such as snow-covered territory, sandy deserts, large bodies of water or grassy hills.

Chapter 3. OPERATING INSTRUCTIONS

3.1 Installation and Mounting

CAUTION:
To protect the image intensifier tube when the device is not in use or when it is being operated in daylight, keep the protective objective lens cap securely fitted over the lens.

3.1.1 NM-108 BC Battery Installation

NOTE:
At operating temperatures below -20 °C , alkaline battery life will be severely reduced. Under said conditions, the use of lithium battery is recommended.

CAUTION:
Ensure that the device is off before installing a battery.

Install the battery as follows (refer to Figure 3-1):
1. Unscrew the battery cap (E) and check the position of the adapter (D). See Figure 3-2 for the correct positioning of the threaded adapter, which changes depending on the battery being installed.
2. If necessary, change the adapter position in the cap. Use the special wrench.

3. Install the battery (C) into the battery compartment (B). Follow the battery symbol (A).
4. Replace the battery cap (E).

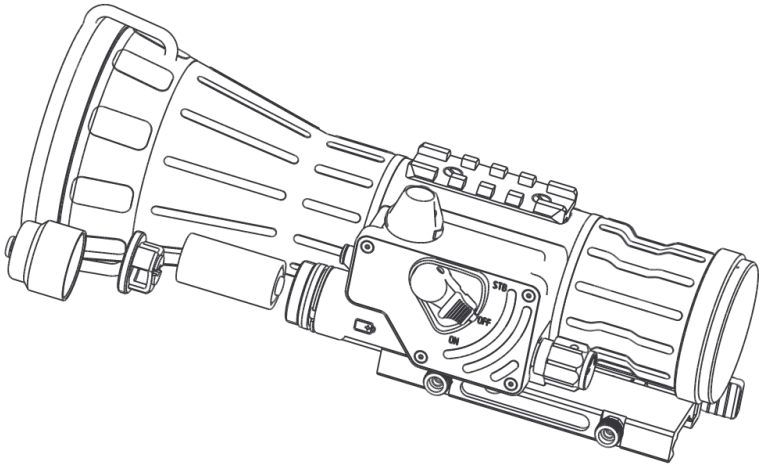

Figure 3-1. THE NM-108 BC. BATTERY INSTALLATION

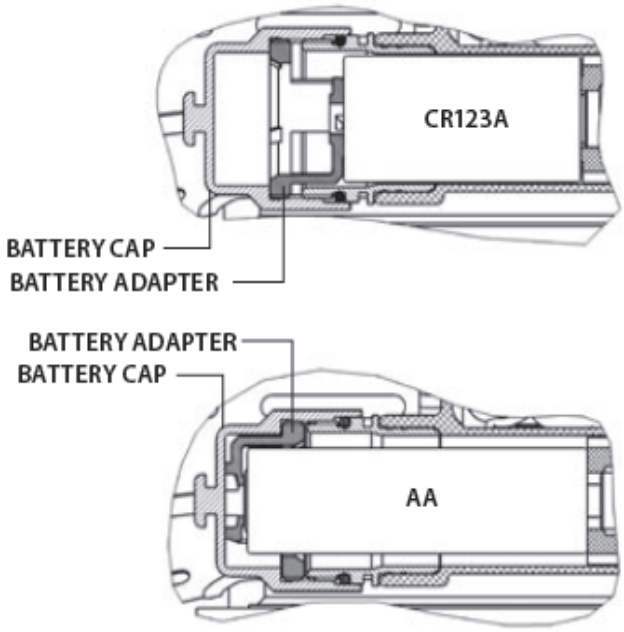

Figure 3-2. POSITIONS OF THE ADAPTER IN THE BATTERY CAP

3.1.2 Installing the NM-108 BC on a Picatinny / Weaver Rail

WARNING:
When installing the equipment on a weapon, be sure the weapon is clear and the safety is on before proceeding.

WARNING:
It is recommended that you use an eyecup on the eyepiece of the day scope, allowing for the eyepiece diameter and eye relief and having side paddle preferably in order to escape detection.

NOTE:
Optical axes of the NM-108 BC and day scope should align. It is not recommended for the distance between the axes to exceed 3 mm. If the difference in the axis heights of the NM-108 BC and day scope above the weapon rail exceeds 3 mm, you will need to replace the day scope mounting rings or monoblock.

The NM-108 BC on Picatinny rail in front of a day scope is shown in Figure 3-3.

Install the NM-108 BC on a Picatinny / Weaver rail in front of a day scope as follows:

1. Remove the output lens cap and place it in the storage case.
2. Remove the light suppressor from the storage case. Put it on the output lens in place of the cap.
3. Unlock the clamping device of the NM-108 BC mount by pushing down on the dogs (A, see Figure 3-4) and unlocking the levers (B).
4. Install the NM-108 BC on the Picatinny / Weaver rail in front of the day scope so that the stops (A, Figure 3-5) slide into the transverse slots on the rail. The light suppressor should cover the day scope's objective lens.
5. Affix the NM-108 BC to the rail by locking the levers (B, Figure 3-4).
6. Verify that the clamping device is firmly holding the NM-108 BC. If necessary, adjust the clamping device's lever-cam locks as detailed in Part 3.1.4 (Clamping Device Adjustment).

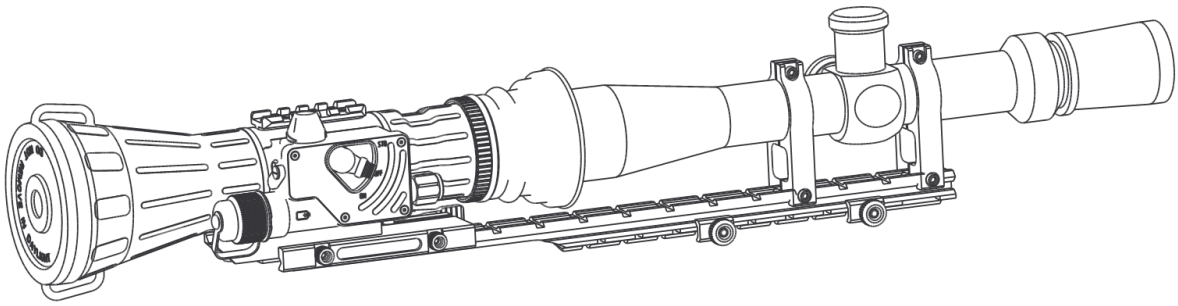

Figure 3-3. THE NM-108 BC INSTALLED ON A PICATINNY RAIL IN FRONT OF A DAY SCOPE

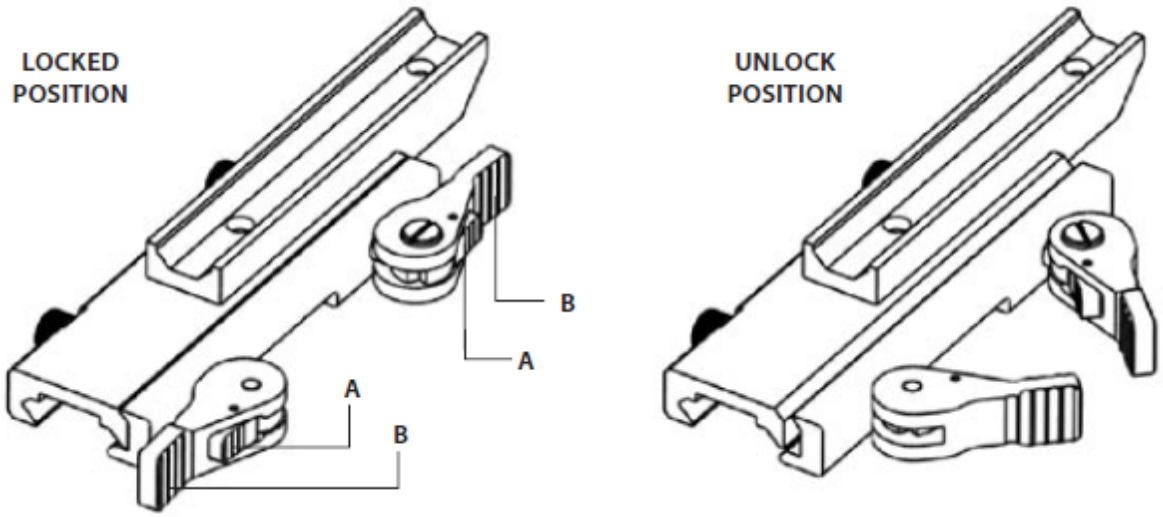

Figure 3-4. MOUNT. TOP VIEW

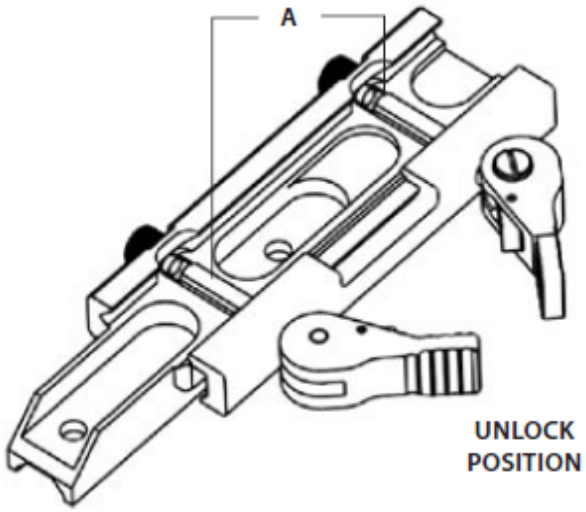

Figure 3-5. MOUNT. UNDERSIDE VIEW

3.1.3 Clamping Device Adjustment

Adjust the mount clamping device as follows (refer to Figure 3-6):

1. Remove the NM-108 BC from the weapon.
2. With the clamping device unlocked (as shown in Figure 3-6), push the cam (B) towards the arrow, which will cause the nut (A) to slide out of its hollow.
3. To tighten / loosen the clamping device, push down on the cam (B) and turn the nut (A) CW/ CCW respectively, in one-two increments (see note below). Much like when the cam (B) is released, backward-moving springs will cause the nut (A) to slide back into its hollow.

> **NOTE:**
> The eight-sided nuts of the mount lever-cam locks will only fit into their hollows only if turned in one of the discrete positions using increments equal to $360^{o}/8$.

4. Verify that the adjusted lever-cam lock is firmly holding the NM-108 BC.
5. Repeat the procedure to adjust the clamping device's second lever-cam lock.

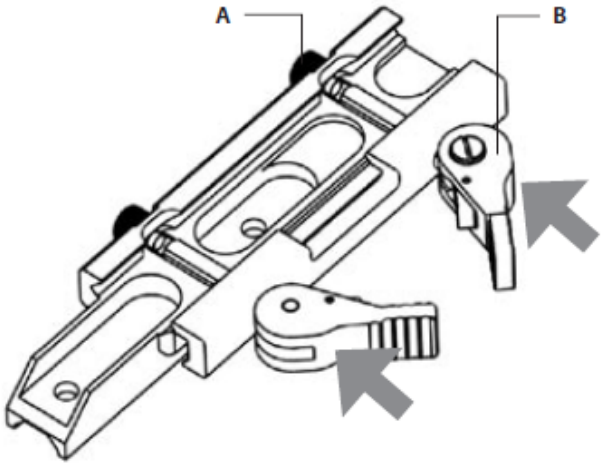

Figure 3-6. CLAMPING DEVICE ADJUSTMENT

3.1.4 Fastening Remote Control Unit to Weapon

Using Velcro tape (A), fasten the wireless remote control unit (B) (Figure 3-7) to a weapon in an easily accessible place (e.g., on the front of the rifle stock) on the side of the NM-108 BC's control compartment preferably.

If the rifle has a Picatinny or Weaver rail on the forend you can use the Picatinny adapter for the wireless remote (C). Install adapter on the rail. Insert the wireless remote control unit in the adapter.

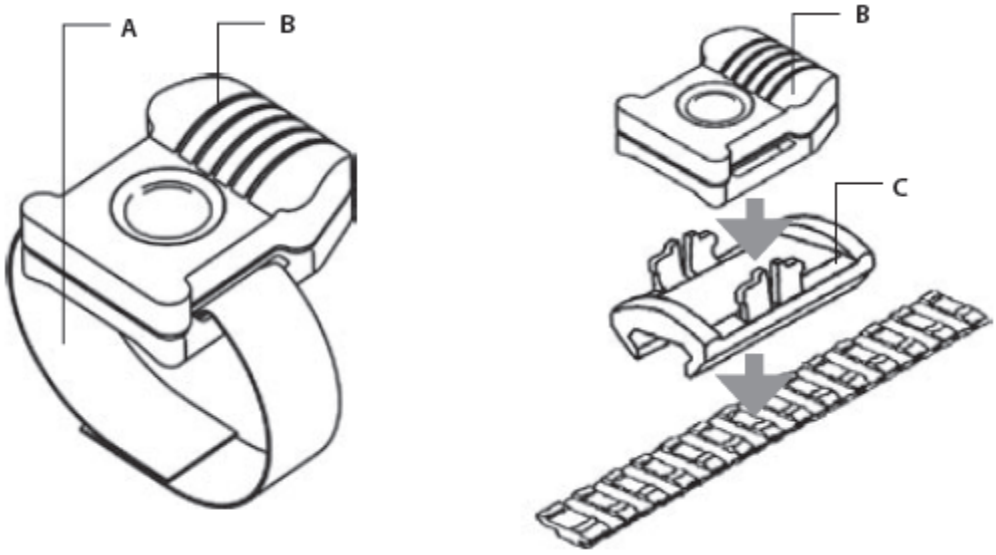

Figure 3-7. REMOTE CONTROL UNIT

3.2 Controls and Indicators

CAUTION:
DO NOT force the equipment controls past their stopping points.

3.2.1 NM-108 BC Controls and Indicators

The NM-108 BC controls are shown in Figure 3-8.
The MN-108 BC controls and indicators are defined in Table 3-1. The ITEM NO. column indicates the number used to identify items in Figure 3-8.
The NM-108 BC controls described elsewhere in this manual (levers and nuts of clamping device) are omitted in this Part.

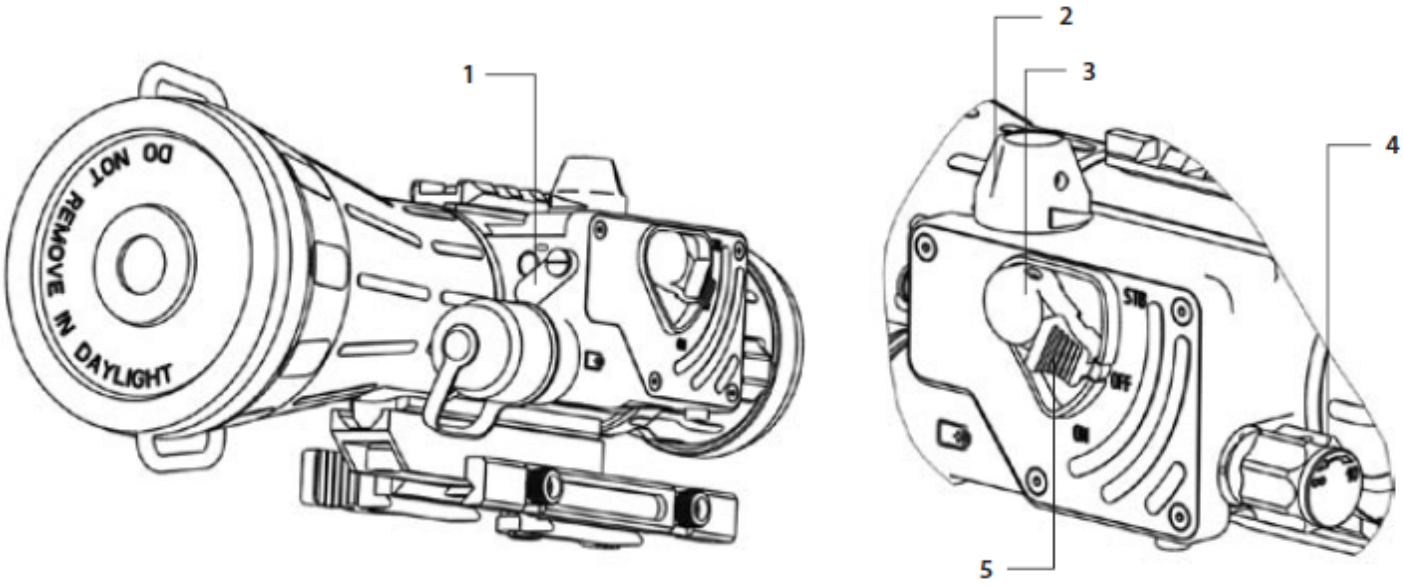

Figure 3-8. NM-108 BC CONTROLS

TABLE 3-1. NM-108 BC CONTROLS AND INDICATORS

ITEM NO.	CONTROL / INDICATOR	FUNCTION
1	Pivoted Shutter	Closes / opens the photoreceiver when placed in the highest / lowest position.
2	Gain Control Knob	Adjusts the brightness of the image.
3	Turn Switch	Switches on the NM-108 BC, when turned CW from OFF to ON position. **NOTE:** Both ON and STB positions can only be entered if the switch is unlocked by pushing the spring-loaded stop (5) before turning. Switches the device to standby mode, when turned CCW from OFF to STB (see note above). Switches off the NM-108 BC, when turned CCW/ CW from ON/ STB to OFF.
4	Focus Knob	Focuses the objective lens. Adjusts for sharpest view of the scene. The total focus range is covered with 1.5 turn of the knob. Directions of focus (sharper to softer) are designated by a double arrow on the knob.
5	Spring-loaded Stop - Remote Control Button - Built-in LED Indicator	Locks the turn switch in OFF position. Activates/ deactivates the NM-108 BC in standby when pressed / released. PERMANENT RED GLOW in viewing area indicates excessive light conditions. After 10 seconds the image intensifier tube will be cut off. The NM-108 BC turns back again when moved away from the excessive light. FLASHING RED LIGHT in viewing area indicates a low battery. LED flashes three times every 3 minutes.

3.3 Operating Procedures

3.3.1 Operating NM-108 BC

Operating procedures should be performed in night light conditions only.

> **CAUTION:**
> USE OF THE CO-LR IN BRIGHTLY LIT CONDITIONS MAY DAMAGE THE IMAGE INTENSIFIER TUBE.

> **CAUTION:**
> PAY ATTENTION TO THE CAUTION NOTICE ON THE OBJECTIVE LENS CAP: “DO NOT REMOVE IN DAYLIGHT”.

1. Verify that the battery is installed as required.
2. Perform a visual estimation of the illumination level in the viewing area, using the reference data presented in Appendix A. You can begin operating the NM-108 BC if the illumination level is less than 1 lx.
3. Remove the objective lens cap and place it over the lens’ housing.

> **CAUTION:**
> BEFORE REMOVING THE OBJECTIVE LENS CAP, VERIFY THAT THE PHOTORECEIVER IS OPEN.

4. Verify that there are no bright light sources in the NM-108 BC field of view. Turn the device on. After a slight delay, a green glow will appear in the day scope’s output lens.

> **CAUTION:**
> AVOID EXPOSING THE DEVICE TO BRIGHT LIGHT SOURCES SUCH AS FIRELIGHT, HEADLIGHTS, SEARCHLIGHTS, ETC., AS THESE CAN DAMAGE THE NM-108 BC.

5. To operate the NM-108 BC in short-time activation mode, turn the device on standby. To activate the NM-108 BC, press and hold the remote control button. Release the remote control button to deactivate the NM-108 BC.
6. Observe the scene. Adjust the focus by rotating the NM-108 BC focus knob until the image becomes clear and sharp.
7. Adjust the image contrast by rotating the NM-108 BC gain control knob.
8. If the day scope includes a focusing ring (i.e., parallax adjustment knob), adjust the focus for a parallax free image.
9. Turn on the day scope’s reticle illumination and adjust the reticle brightness.

> **CAUTION:**
> DO NOT LEAVE THE NM-108 BC ACTIVATED IF IT IS NOT BEING USED.

> **NOTE:**
> AUTOMATIC INTERRUPTING TIME IS 60 MINUTES. TO RESUME OPERATION, YOU WILL NEED TO RESTART THE NM-108 BC.

3.3.2 Operating in Changing Light Conditions

If a mission must be carried out in changing light conditions, you can deactivate the bright light protection system of the NM-108 BC. To shut down the protection system, close the photoreceiver by flipping up the pivoted shutter.

CAUTION:
AFTER YOUR MISSION IS COMPLETE, OPEN THE PHOTORECEIVER BY FLIPPING THE PIVOTED SHUTTER DOWN.

3.3.3 Shut-Down

Shut-down the NM-108 BC as follows:

1. Turn the device OFF. The green glow will disappear.
2. Place the cap over the objective lens.
3. Remove the NM-108 BC from the weapon.
4. Remove the light suppressor from the output lens.
5. Replace the cap on the output lens.
6. Remove the batteries.

CAUTION:
DO NOT STORE THE EQUIPMENT WITH THE BATTERY STILL IN IT.

CAUTION:
REMOVE THE LIGHT SUPPRESSOR FROM THE NM-108 BC TO AVOID DEFORMATION OR DAMAGE.

7. Ensure that the NM-108 BC and any accessories are clean and dry before placing them into the storage case.
8. Place the NM-108 BC and any accessories into the storage case.
9. Store the NM-108 BCand accessories in the appropriate locations in the case and close the cover.

Chapter 4. PREVENTIVE MAINTENANCE AND TROUBLESHOOTING

4.1 Preventive Maintenance Checks and Services (PMCS)

Table 4-1: Preventive Maintenance Checks and Services, has been provided so that you can keep your equipment operable and in good condition.
Perform all functional tests in the order listed in Table 4-1.
Operating Procedures are detailed in Chapter 3.

Always observe any CAUTIONS that appear in the table.

Explanation of Table Entries:
SEQ NO. column. Sequence numbers are for reference and appear in the order required to perform checks and services.
LOCATION / ITEM TO CHECK / SERVICE column. Indicates the location and the item to be checked or serviced.
PROCEDURE column. Details the checking / servicing procedure.
NOT FULLY MISSION CAPABLE IF… column. Indicates what faults will prevent your equipment from operating successfully.

TABLE 4-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

SEQ. NO.	ITEM TO CHECK	CHECKING PROCEDURE	NOT FULLY MISSION CAPABLE IF:
BEFORE OPERATION CHECKS			
1	Completeness	Inventory items by comparing them with the data specified in this manual.	Items are missing.
2	Body	Inspect for cracks or damage. Scratches and gouges are OK if operation is not affected. Inspect for missing parts (purge screw, knobs).	Cracked or damaged. Purge screw or knob is missing.
3	Objective Lens Cap	Inspect for cuts, tears and dirt. Clean as required.	Cap is torn or cut.
4	Output Lens Cap	Inspect for dirt or O-ring damage. Clean as required.	Cap is not held up on the lens housing.
5	Battery Compartment / Cap with Adapter	Check to make sure the adapter is present. Check for corrosion, cap damaged or retainer breaks. Check O-ring for cuts or damage.	Retainer is broken. Cap, O-ring or adapter is damaged or missing.
6	Switch	Check for operation (without battery).	Switch is inoperative.
7	Lenses	Inspect for cleanliness, scratches, chips or cracks. Clean as required.	Chipped or cracked. Scratches hinder vision through the NM-108 BC.
8	Photoreceiver	Inspect for cleanliness, scratches. Clean as required.	Photoreceiver is damaged.
9	Focus Knob	Check to ensure there is free rotation through full range of travel (1.5 turn).	Knob is inoperative.
10	Remote Control Unit	Check for damage. Check Velcro tape for wear.	Damaged. Unit or tape is missing.
11	Light Suppressor	Inspect for cuts or tears. Check ease of installation and removal.	Light suppressor is torn or cut.
12	Mount	Inspect for damage or corrosion, and for missing parts. Check for proper operation.	Damaged. Some parts are missing. Clamping device is inoperative.
OPERATIONAL CHECKS **CAUTION:** The objective lens cap has an optical filter, which allows operational testing of the NM-108 BC in daylight. Activate the NM-108 BC in daylight with the objective lens cap on or in dark conditions. **NOTE:** Daylight checks are described below.			

CAUTION: DO NOT forget to open the photoreceiver after finishing operational checks			
13	NM-108 BC Switch	Insert the battery. Remove the output lens cap. Close the photoreceiver by flipping up the pivotal shutter. Turn the switch to ON position. Look for green glow (after a slight delay) in viewing area. Open the photoreceiver by flipping the pivotal shutter down. Look through the output lens and wait about 10 seconds for green glow to disappear.	No green glow. Green glow is present, yellow glow is absent.
14	Remote Control	Close the photoreceiver. Put the device in STB. Press and hold the remote control button. Look for the green glow in output lens. Release the button. Turn the device off.	Green glow is absent.
15	Focus Knob	Turn the device on. Rotate the knob to ensure it adjusts for focus.	Knob does not adjust for focus.
16	Gain Control Knob	Rotate the gain control knob to ensure it changes the screen brightness.	Knob does not adjust the screen brightness.
17	Viewed Image	Inspect for any operational defects (refer to Section 4.3: Inspection Criteria for Proper Image Intensifier Tube Operation).	Shading, edge glow, flashing, flickering, and intermittent operation, or excessive cosmetic defects are found.
AFTER CHECKING PROCEDURES			
18	Turn off the NM-108 BC. Replace the protective cap on the NM-108 BC output lens. Remove the batteries. Return the NM-108 BC and all accessories to the storage case.		

4.2 Operator Troubleshooting

The purpose of troubleshooting is to identify the most commonly occurring equipment malfunctions, their probable causes, and the corrective actions required to fix them.

Table 4-2 lists the common malfunctions that may occur during the operation or maintenance of the NM-108 BC. Perform the tests, inspections, and corrective actions in the order listed in the table.

This table cannot list all of the malfunctions that may occur with the NM-108 BC, or all of the tests and corrective actions that may be necessary. If you experience an equipment malfunction that is not listed, or is not fixed by the corrective actions listed in the table, please contact Armasight's Customer Service center.

TABLE 4-2. OPERATOR TROUBLESSHOOTING

MALFUNCTION	PROBABLE CAUSE / TEST/ INSPECTION	CORRECTIVE ACTION
Equipment fails to activate.	Battery is missing or improperly installed. Battery is dead. Battery surfaces or contacts are dirty or corroded. Remote control unit is damaged. Remote control batteries are dead. Defective image intensifier tube.	Insert battery or install it correctly. Replace battery. Clean the contact surfaces with a pencil eraser and / or alcohol and cotton swabs. Please contact Customer Support. Replace the batteries as per Part 4.4.3. Please contact Customer Support.
Poor image quality.	Check focus. Objective and output lenses are dirty. Damaged optical components.	Refocus. Thoroughly clean the surface of each lens. Please contact Customer Support.
LED indicator fails to activate.	Visual inspection.	Please contact Customer Support.
The NM-108 BC affects boresight after installation or during the firing.	Factory alignment is broken.	Please contact Customer Support.
Hindered rotation of the battery cap.	Dirty cap thread. Damaged cap thread.	Clean the thread. Please contact Customer Support.
Battery adapter difficult to remove.	Check for damaged adapter and battery cap.	If damaged please contact Customer Support.
Light visible around light suppressor.	Incorrect position of the NM-108 BC relative to the day scope. Check the light suppressor resilience.	Align the NM-108 BC position relative to the day scope. If light suppressor is defective please contact Customer Support.

4.3 Inspection Criteria for Proper Image Intensifier Tube Operation

4.3.1 Operational Defects

Operational defects relate to the reliability of the intensifier, and are an indication of instability. If identified, the user will need to return the NM-108 BC immediately. Operational defects include shading, edge glow, flashing, flickering, and intermittent operation.

A. Shading
If shading is persistent, you will not be able to see a fully circular image (Figure 4-1). Shading is a very dark, high-contrast area with a distinct line of demarcation present, and you cannot see an image through it. Shading always begins on the edge and will eventually migrate inward until it spans across the entire image area. If you notice shading with your device, please contact Customer Support.

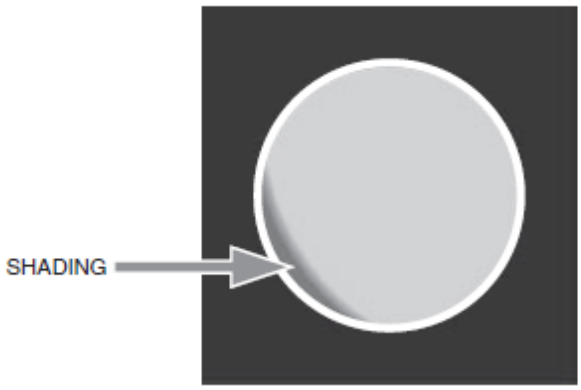

Figure 4-1. SHADING

NOTE:
VERIFY THAT ANY SHADING IS NOT THE RESULT OF IMPROPER EYE-RELIEF ADJUSTMENT.

B. Edge Glow
Edge glow is a bright area (it sometimes appears to be coloring) in the outer portion of the viewing area (see Figure 4-2). To check for edge glow, block out all light from the device by cupping a hand over the lens. If the image intensifier tube is displaying edge glow, the bright area will still show up; if edge glow occurs please contact Customer Support.

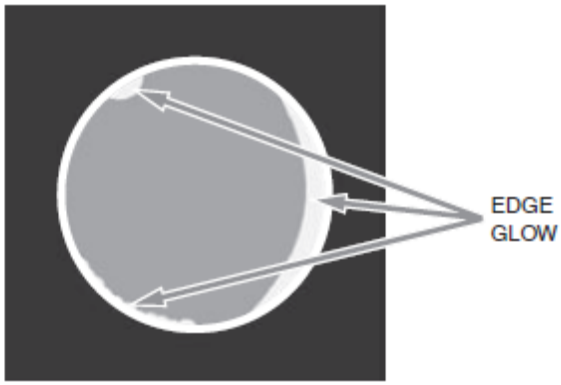

Figure 4-2. EDGE GLOW

C. Flashing, Flickering, or Intermittent Operation
The image may appear to flicker or flash. If there is more than a single flicker, check for a loose battery adapter or a weak battery. If flickering continues, please contact Customer Support.

4.3.2 Cosmetic Blemishes

Cosmetic blemishes are usually the result of manufacturing imperfections. They do not affect the reliability of the image intensifier tube, and are not normally a cause for returning the NM-108 BC. However, some types of cosmetic blemishes can worsen over time and interfere with the user's ability to properly operate the device during missions. If you believe a cosmetic blemish is cause for returning the device, record the specific nature of the problem on the maintenance forms and use the clock method to identify the position of the blemish and approximate distance from the center (e.g., 5:00 toward the outside, 2:30 near the center, or 1:00 midway).
The following are examples of cosmetic blemishes:

A. Bright Spots
A bright spot is a small, non-uniform bright area that may flicker or appear constant (Figure 4-3).
Not all bright spots make the NM-108 BC returnable. Cup your hand over the lens to block out all light. If the bright spot remains, please contact Customer Support.
Bright spots usually go away when all light is blocked out. Verify that any bright spots are not simply the result of bright light in the area you are observing. Bright spots are acceptable if they do not interfere with the user's ability to view the scene or perform missions.

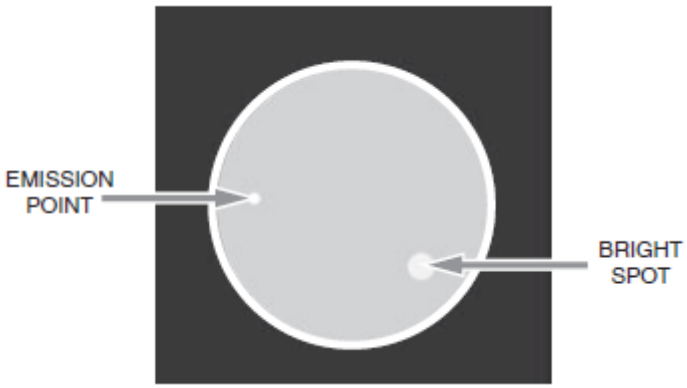

Figure 4-3. EMISSION POINTS AND BRIGHT SPOTS

B. Emission points
Emission points are steady or fluctuating pinpoints of bright light in the image area that do not go away when all external light is blocked from the objective lens (Figure 4-3). The position of an emission point within the image area does not move. Not all emission points are cause to return the NM-108 BC. Verify that emission points are not simply light sources present in the scene you are observing. Emission points are acceptable if they do not interfere with the user's ability to perform missions.

C. Black Spots
Black spots are cosmetic blemishes in the image intensifier or debris between the lenses. Black spots are acceptable as long as they do not interfere with the user's ability to observe the scene. No action is required if this condition is present, unless the spots interfere with the operator's ability to perform missions.

D. Fixed-pattern Noise
Fixed-pattern noise is usually a cosmetic blemish characterized by a faint hexagonal (honeycomb) pattern that appears throughout the viewing area. This typically occurs in excessively lit environments or when viewing very bright lights (See Figure 4-4). This pattern can be seen in every image intensifier if the level of light is high enough. This condition is acceptable as long as the pattern does not interfere with the user's ability to view an image or their ability to perform missions.

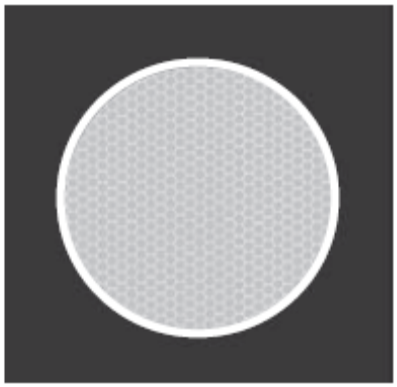

Figure 4-4.
FIXED PATTERN NOISE

E. Chicken Wire

Chicken Wire is an irregular pattern of dark thin lines that can appear in the field of view, either throughout the image area or in sections of the image area (See Figure 4-5). In the worst-case scenario, these lines will form hexagonal or square, wave-shaped lines. No action is required if this condition is present, unless it interferes with the user's ability to view an image or their ability to perform missions.

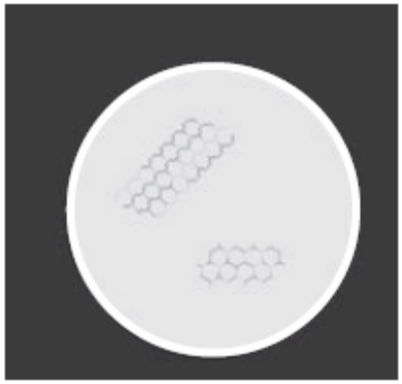

Figure 4-5. CHICKEN WIRE

4.4 Maintenance

4.4.1 General

The NM-108 BC operator maintenance consists of operational tests, inspections for the unit serviceability, cleaning and mounting procedures, corrective actions (troubleshooting and replacement of a limited number of parts). Maintenance instructions covered elsewhere in this manual (PMCS, troubleshooting, etc.) are not repeated in this section.

> **CAUTION:**
> The NM-108 BC is a precision electro-optical instrument and must be handled carefully at all times to prevent damage.

4.4.2 Cleaning Procedures

> **CAUTION:**
> Thoroughly dry each item before placing them into the storage case.

Clean the NM-108 BC as follows:

1. Gently brush off any dirt from the device's body using a clean soft cloth.
2. Moisten the cloth with fresh water and gently wipe external surfaces (**except** for glass surfaces).
3. Dry any wet surfaces (**except** for glass surfaces) with another clean, soft, dry cloth.
4. Using a lens brush, carefully remove all loose dirt from the glass surface.
5. Slightly dampen a cotton swab with ethanol. Gently and slowly wipe the lenses (including the photoreceiver and the pivotal focusing lens). Without touching the lens holders, clean the glass surfaces in circular movements, beginning in the centre and moving out towards the edge. Change the cotton swab after each circular stroke. Repeat until the glass surfaces are clean.
6. Clean the battery surfaces and contacts with a pencil eraser and/or alcohol-dampened cotton swabs.

Clean optional equipment with a soft brush (cloth), soap, and water as required.

4.4.3 Battery Removal and Replacement

Refer to Parts 3.1.1 for the NM-108 BC battery installation procedure, respectively.

Replace the remote control batteries as follows:

1. Using a screwdriver, unscrew the four screws (A, Figure 4-6) that affix the cover to the bottom of the unit. Remove the cover.
2. Replace the batteries with two new ones (CR2016, 3V). Stack the batteries in its place under the leaf contact spring with the minus contacts directed towards the electric board, as the minus sign etched on the board indicates.
3. Replace the cover and retighten the screws (A).

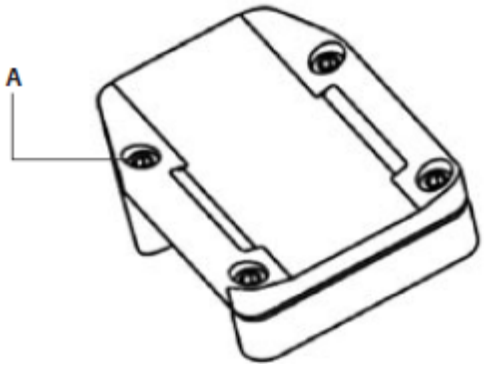

Figure 4-6. REMOTE CONTROL UNIT. BATTERY INSTALLATION

APPENDIX A

(Reference)

ESTIMATION OF AMBIENT ILLUMINATION LEVEL

Table A-1 lists some common natural light conditions and their corresponding representative illumination values.

TABLE A-1. STANDARD NATURAL LIGHT CONDITIONS AND ILLUMINATION VALUES

Standard Natural Light Conditions	Illumination Value, lx
Quarter moon	0.05
Full moon	0.30
Late twilight sky	1.00
Twilight sky	10.00
Overcast sky in the daytime	500.00